INTERNATIONAL CIVIL AVIATION ORGANIZATION

**AFI PLANNING AND IMPLEMENTATION REGIONAL GROUP
NINETEENTH MEETING (APIRG/19)
Dakar, Senegal (28 – 31 October 2013)**

Agenda Item 3: Performance Framework for Regional Air Navigation Planning and Implementation

3.3: AFI Regional Monitoring Agency (ARMA)

AFI RVSM Collision Risk Assessment No. 6

(Presented by ARMA)

SUMMARY
This WP presents the 3nd post-implementation Collision Risk Assessment (CRA) for Reduced Vertical Separation Minimum (RVSM) in the AFI Region. The assessment addresses two of the AFI RVSM Safety Policy objectives, i.e. an assessment of the Technical Vertical Collision risk and an assessment of the Total Vertical Collision risk. State authorities will hereby be informed as to the AFI RVSM system risk.
REFRENCE(S): ICAO Doc 9574; ICAO Doc 9937; AFI RVSM Safety Policy; AFI RVSM CRA 6
Related ICAO Strategic Objective(s): A B & E

1. INTRODUCTION

1.1 The AFI Regional Monitoring Agency, monitoring the RVSM system, is required by the provisions of ICAO Document 9937, Operating Procedures and Practices for Regional Monitoring Agencies in Relation to the Use of a 300 m (1 000 ft) Vertical Separation Minimum Between FL 290 and FL 410 Inclusive, to provide APIRG with an annual overview relating to RVSM risk within the AFI Region based on the annual quantitative Collision Risk Assessment.

1.2 The meeting should recall that AFI CRA are, inter alia, calculated by making use of the monthly RVSM safety assessment traffic data which is collected by Area Control Centers and submitted to the ARMA to monitor RVSM system safety and risk. Further to this Unsatisfactory Condition Reports (UCR) deposited into the central depository database managed by the ICAO TAG are reviewed and where applicable processed into the CRA.

1.3 CRA 6 presents the 3rd post-implementation CRA for RVSM in the AFI Region. The assessment addresses two of the AFI RVSM Safety Policy objectives, i.e. an assessment of the Technical Vertical Collision risk evaluated against the agreed to Target Level of Safety (TLS) of 2.5×10^{-9} fatal accidents per flight hour, and an assessment of the Total Vertical Collision risk evaluated against the agreed to TLS of 5×10^{-9} fatal accidents per flight hour.

1.4 The working paper will be supported by a short power point presentation to emphasize the salient points.

2. DISCUSSION

2.1 The Technical Vertical Collision risk estimate was once again calculated to be below the Technical Vertical TLS of 2.5×10^{-9} fatal accidents per flight hour however the estimate of the Total Vertical collision risk does not meet the total vertical TLS of 5×10^{-9} fatal accidents per flight hour as for all the previous CRA's. These results are expounded on during the following discussion.

2.2 The Technical Vertical Collision risk estimate was found to be met by a factor of approximately 21 below the agreed to TLS.The Technical Vertical Collision risk estimate is affected by a number of limitations in the traffic flow data used for estimating the passing frequency parameter of the collision risk model. Precise and complete traffic flow data must be collected by all FIR's to make the passing frequency estimates more reliable. The aircraft population is integral with regard to the overall Altimetry System Error (ASE) distribution, and for the second consecutive assessment ARMA included ASE measurements obtained from the AFI GMU Height Monitoring Program. All operators should be participating in the program as stipulated in ICAO Annex 6.

2.3 The meeting should recall that the Total Vertical Collision Risk is calculated by including the Technical Vertical Collision Risk. The Total Vertical Collision Risk exceeded the agreed to TLS by a factor of 4.7 which is a decrease of 30% from the previous assessment. The dominant component affecting the total vertical risk was the risk created due to aircraft having levelled off at the incorrect flight level. The afore-mentioned scenario is true for both opposite and same direction traffic at incorrect flight levels. The estimate is considered as conservative due to a lack, in some cases, of precise and complete information and could therefore be higher as under reporting is also prevalent. Encouraging and managing precise and complete Unsatisfactory Condition Reports and Large Height Deviation information is essential and should be supported by all in the Aviation Community.

2.4 RVSM collision risk is negatively affected by the very accurate GNSS based navigation both during flight and CRA calculations. The risk could be reduced by the official documented application of the Strategic Lateral Offset Procedure (SLOP) uniformly applied in all FIR's as presented to APIRG 18. In order to use the risk mitigating effect of lateral offsets for passing frequency into account, it needs to be officially published and implemented so that it can be quantified. Since SLOP is currently an unknown factor for the quantative assessment, the beneficial effects of lateral offsets have not been taken into account in CRA 6. SLOP is therefore a means to reduce the increase in the probability of vertical overlap.

2.5 A SLOP implementation survey was conducted during 2012 when States were requested via State Letter, Ref. ES AN 4/45 – 0945, to report their SLOP status in FIR's under their jurisdiction. APIRG Conclusion 17/43, Implementation of Strategic Lateral Offsets (SLOP) in the AFI Region, refers. Eleven FIR's reported leaving nineteen FIR's not reported on. It is envisaged that the survey will be requested again focussing on the nineteen FIR's that did not respond.

2.6 The Assessment was difficult to compile due to the absence of data from various FIR's. The collection of data from ALL FIR's cannot be over emphasized. It is encouraging to note that the collection of data has improved with more FIR's submitting. CRA 6 was able to utilise data which constituted 45% of the total that should have been available. This is a 10% increase on the previous data. CRA 6 benefitted from an improved percentage as ASECNA has vastly improved their collection and submission management of RVSM assessment data which covers a large portion of AFI. This is commendable. It should be mentioned that CRA 7 is under development and that the available data now stands at 70%. This is attributed once again to reporting by ASECNA and South Africa.

2.7 CRA's focus specifically on the occurrence of vertical events, Large Height Deviations, with CRA 6 taking 34 vertical events into account whereas CRA 5 had 54 vertical events. The decrease of 20 events is significant.

2.8 As has been discussed in previous CRA's the horizontal events, which are not related to RVSM, have received much attention which has resulted in a significant decrease to 6 events.

2.9 The continued high incidence of Non-RVSM approved aircraft, both civil and State aircraft, specifically where State aircraft fail to flight plan correctly to gain access to RVSM airspace has not been worked into the CRA however remains under discussion for future Assessments. Technically there is a reduction in RVSM separation to adjacent flight levels increasing the risk on each associated flight. This aspect is receiving attention via the TAG.

2.10 The large amount of coordination failures between Area Control Centres and FIR's requires a concerted effort in order to reduce this risk. Aircraft in some cases arrive at reporting points uncoordinated, with incorrect estimates and at incorrect levels. Both technical and ATM solutions will need to be considered.

2.11 CAA's, ATCC's and Aircraft Operators in the AFI region should raise RVSM awareness in order to arrest and bring the Total Vertical Risk back towards the agreed to TLS. RVSM vigilance cannot be over emphasized.

3. ACTION BY THE MEETING

3.1 The meeting is invited to:

a) Take note of the contents of the working paper
b) Support all efforts for the official application of SLOP in all applicable FIR's
c) Support all Technical and ATM solutions to eliminate coordination failures.

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